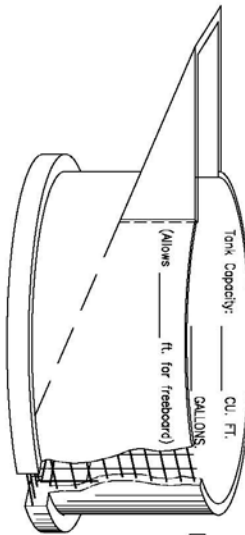


The design is in accordance with strength design requirements detailed in M21 316-05.



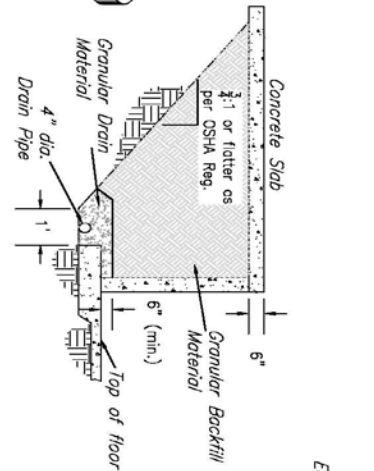
CIRCULAR CONCRETE MANURE TANK

DESIGN LOADING:

1. Manure load: 65 psf/ft. of depth with a Factor of Safety = 1.2.
2. Soil back fill loads: Equivalent Fluid Pressure 45 psf/ft. of depth with no surcharge and a F.S. = 1.6. This requires the structure to be backfilled for adequate drainage. See wall backfill details for fill material and placement requirements necessary to meet wall loading conditions.
3. Supplemental design and calculations performed by TeamG January 9, 2008.

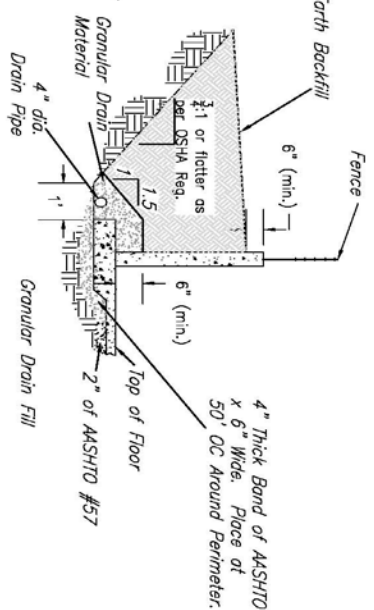
CONSTRUCTION NOTES:

1. All reinforcing steel shall have a yield point of $f_y = 60,000$ psi
 2. For splice lengths, refer to the table on Sheet 2. All bends in reinforcing steel shall have a minimum radius of 3 bar diameters.
 3. All concrete shall have a minimum 28 day compressive strength of 4,000 psi. The mix design shall be submitted to NRCS prior to placement.
 4. Construction joints may be used to facilitate construction. The location of construction joints shall be approved by the Engineer prior to placing the concrete. See Sheet 2.
 5. Refer to manufacturer's recommendation for placing water stop material.
 6. Backfill shall be brought up uniformly around the tank. The maximum difference in the finished back fill elevations around the tank shall be 4 feet.
 7. All construction methods shall meet OSHA regulations.
 8. Foundations (footings) shall extend to below frost depth or otherwise be protected from frost heaving or freezing as approved by the engineer.
 9. Installation of this structure shall conform to NRCS Construction Specifications 313S, 606.
- SAFETY ITEMS:**
1. The tank shall be surrounded by a chain link or woven wire fence with a minimum height of 5'.
 2. Posts shall be cast into the concrete wall or attached to wall with appropriate anchors. Post shall be capped.
 3. Safety stops shall be installed at pushoff locations to prevent accidental entry of equipment, people and animals.
 4. Warning signs shall be erected around the tank stating that entry may result in injury or death.



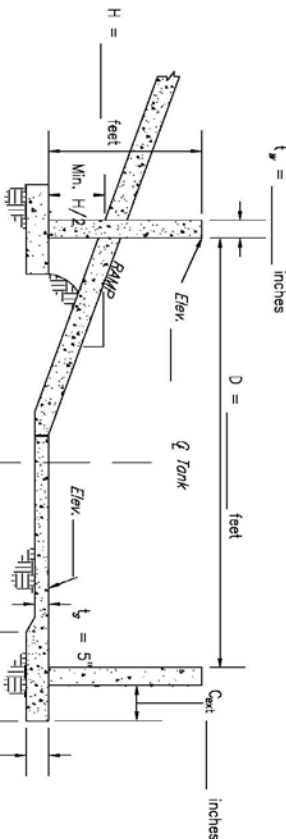
WALL BACKFILL DETAIL – UNLOADING

Loaded manure trucks & tankers shall stay a distance of 3X tank depth away from the outside of the ramp sidewalls.



WALL BACKFILL DETAIL – TYPICAL

1. Provide a minimum 4-inch diameter perforated perimeter drain pipe for wall back fill drainage. Outlet the pipe at a location downstream where flow from the outlet may be monitored, 50' from any stream.
2. Suitable pipe materials include PVC, CPT, or as otherwise approved by the engineer.
3. If a high water table is present, a special drain system will be required under the tank floor to prevent uplift.
4. To provide adequate drainage, the granular drain fill shall be clean with maximum 5 percent fines. The maximum particle size shall be 1.5 inches.
5. Place and compact backfill in uniform 12 inch lifts. Compact with a minimum of two passes of manually directed power tamper over entire surface area for each lift.



TANK FLOOR SECTION

NOT TO SCALE



COUNTY, PENNSYLVANIA
ROUND TANK W/RAMP DETAIL

Drawn by: Lalshane
Reviewed by: Perceveroff
Reviewed by: Flatts

Date: 1/21/02
Date: 1/9/08
Date: 2/1/08

Designed by: PA NRCS
Drawn by: Lalshane/Schaetzle
Checked by: _____
Approved by: _____

Date: 12/01
Date: 1/31/02

DOUBLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Sheets 6.01-6.32, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

SINGLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Result Sheets, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

DOUBLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Sheets 6.01-6.32, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

SINGLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Result Sheets, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

DOUBLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Sheets 6.01-6.32, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

SINGLE REINFORCED CIRCULAR TANK WALL (Not to Scale)

Labels: Horizontal Rebar (A_{sh}), Vertical Rebar (A_{sv}), See Result Sheets, 2" Dowel Bars (A_{dw}) SEE DOWEL BAR TABLE @ spacing as A_{sv} , Vinyl Water Stop (PVC), Footing Ring Steel (A_{sz}), Footing Width (B), Footing Steel (A_{s1}), Floor Steel (A_s), 1/2 slope, 5", Cut Overhang.

Natural Resources Conservation Service
United States Department of Agriculture

COUNTY, PENNSYLVANIA

ROUND TANK W/RAMP DETAIL

Revision: Lachner

Revision: Petersenoff

Revision: Harris

Date: 1/11/02

Date: 1/10/08

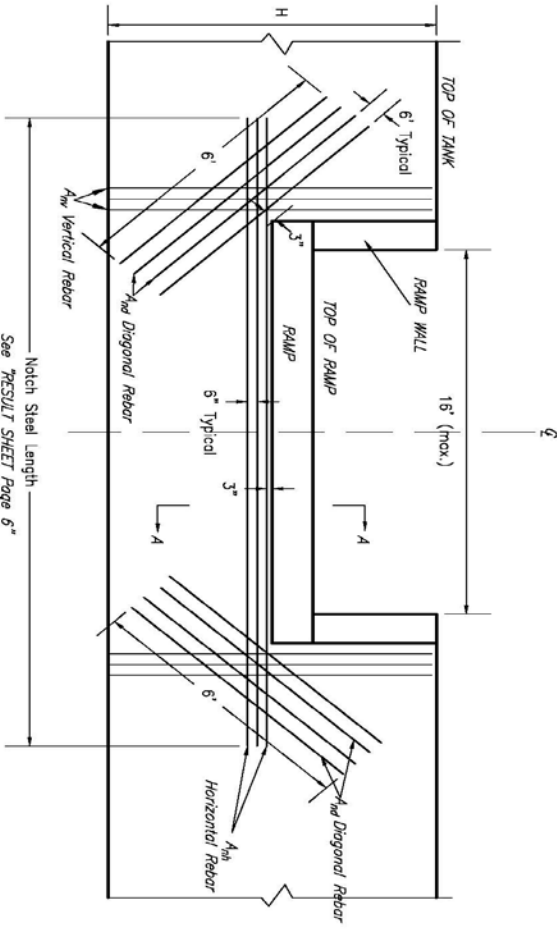
Date: 2/1/08

Drawn: PA Nysa

Draw: Lachner/Schaefer

Checked: _____

Approved by: _____



TANK WALL AT NOTCH – REINFORCEMENT
Elevation

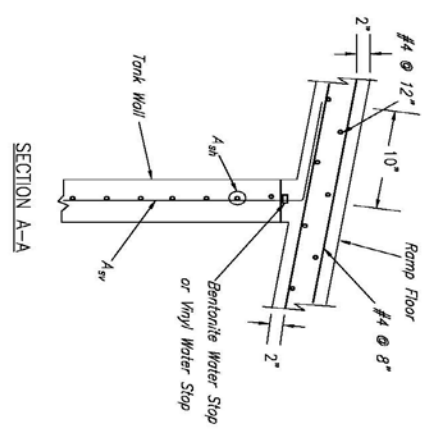
EXTRA STEEL REQUIRED AROUND NOTCH

HEIGHT OF TANK (H)	VERTICAL REBAR (A _v)	HORIZONTAL REBAR (A _h)	DIAGONAL REBAR (A _d)
8', 10'	3-#6 (12 ton)	3-#5	4-#6
12', 14'	4-#6 (16 ton)	4-#5	4-#6

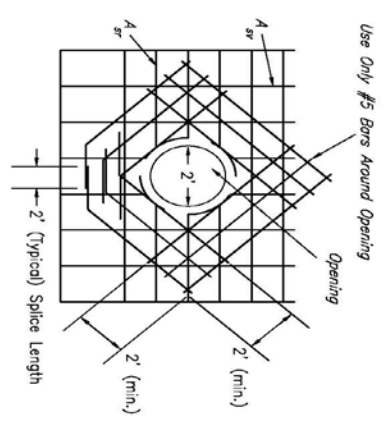
NOTES:

- 1) Tank and rebar A_v and A_{sv} not shown for clarity.
- 2) If tank wall is double reinforced, specified steel must be in each mat of steel.
- 3) Spacing for rebar shown shall be 6".
- 4) Vertical rebar required on each side of the notch, as well as in each side of ramp wall, see "ELEVATION VIEW OF RAMP", Sheet 4

NOT TO SCALE



SECTION A-A



1. Cut all vertical and ring steel 2 inches from opening.
2. For each ring steel bar interrupted by the opening, install one #5 bar around each side of the opening. A minimum of two #5 bars are to be used along each side.
3. Bars spacing shall not be closer than 3 inches C-C and not farther apart than A_{sv} spacing.

DETAIL OF A PIPE PROTRUDING
THROUGH A WALL
(if needed)



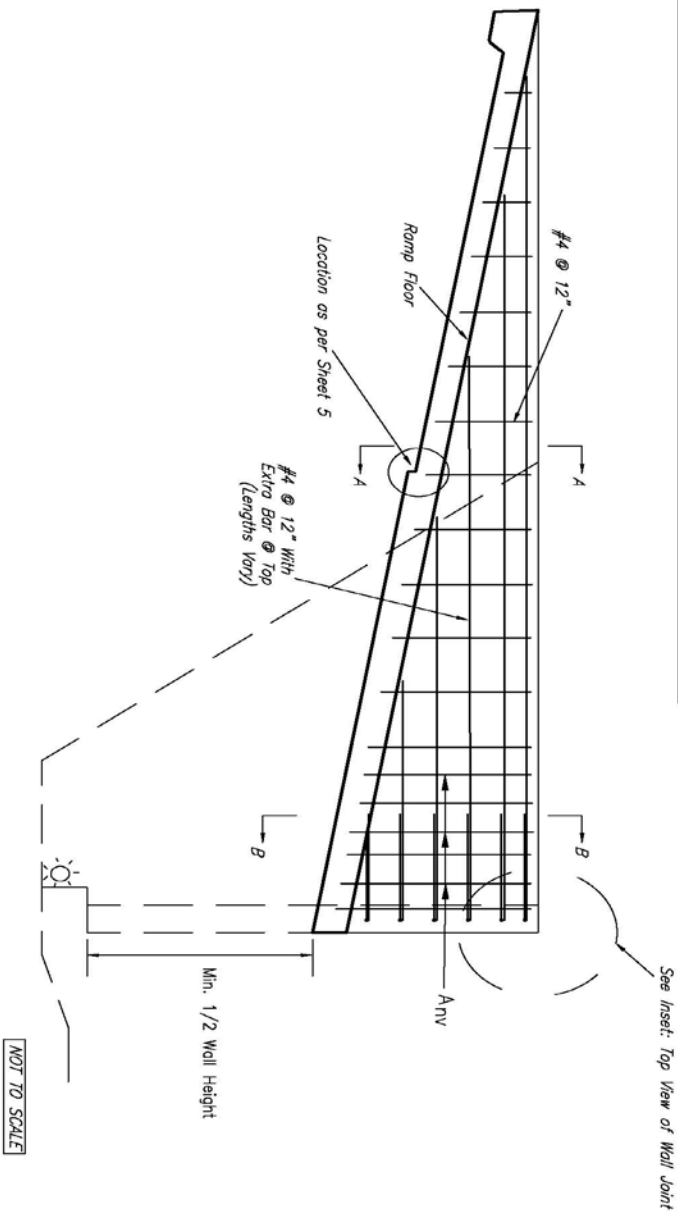
____ COUNTY, PENNSYLVANIA
ROUND TANK W/RAMP DETAIL

Revised: 1/11/02
Revised: 1/26/04
Revised: 2/1/08

Designed: PA NRCS
Drawn: LATSHAW/SCHARTER
Checked: _____
Approved by: _____

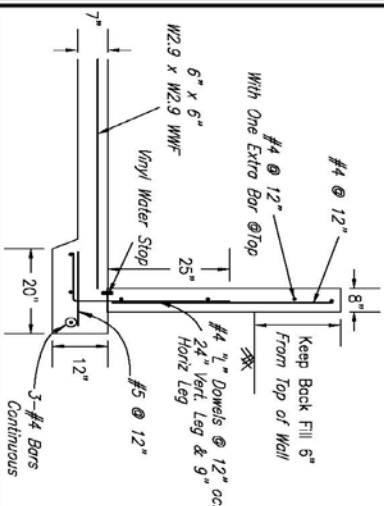
Date: 11/01
1/31/02

ACCESS RAMP THROUGH NOTCHED TANK – ELEVATION VIEW OF RAMP

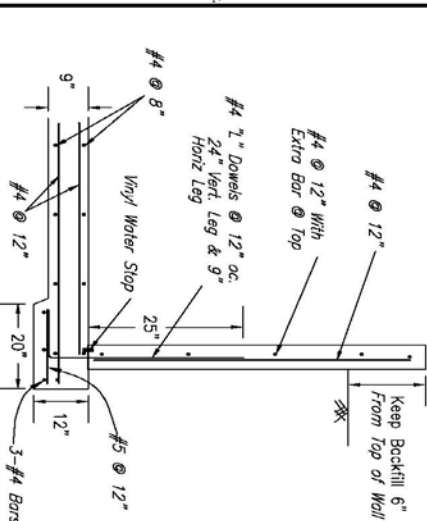


SECTION A-A (Ramp Side Wall)

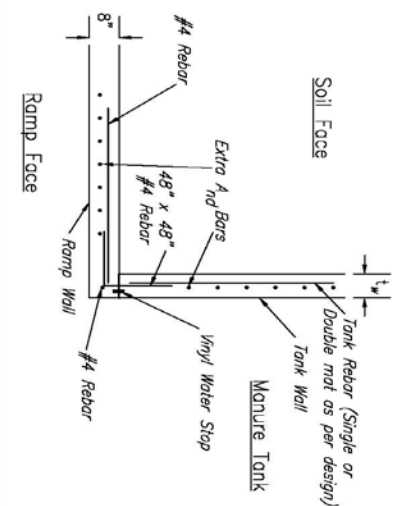
Note: Cut Vertical #4's to Fit Wall Height



SECTION B-B (Ramp Side Wall)



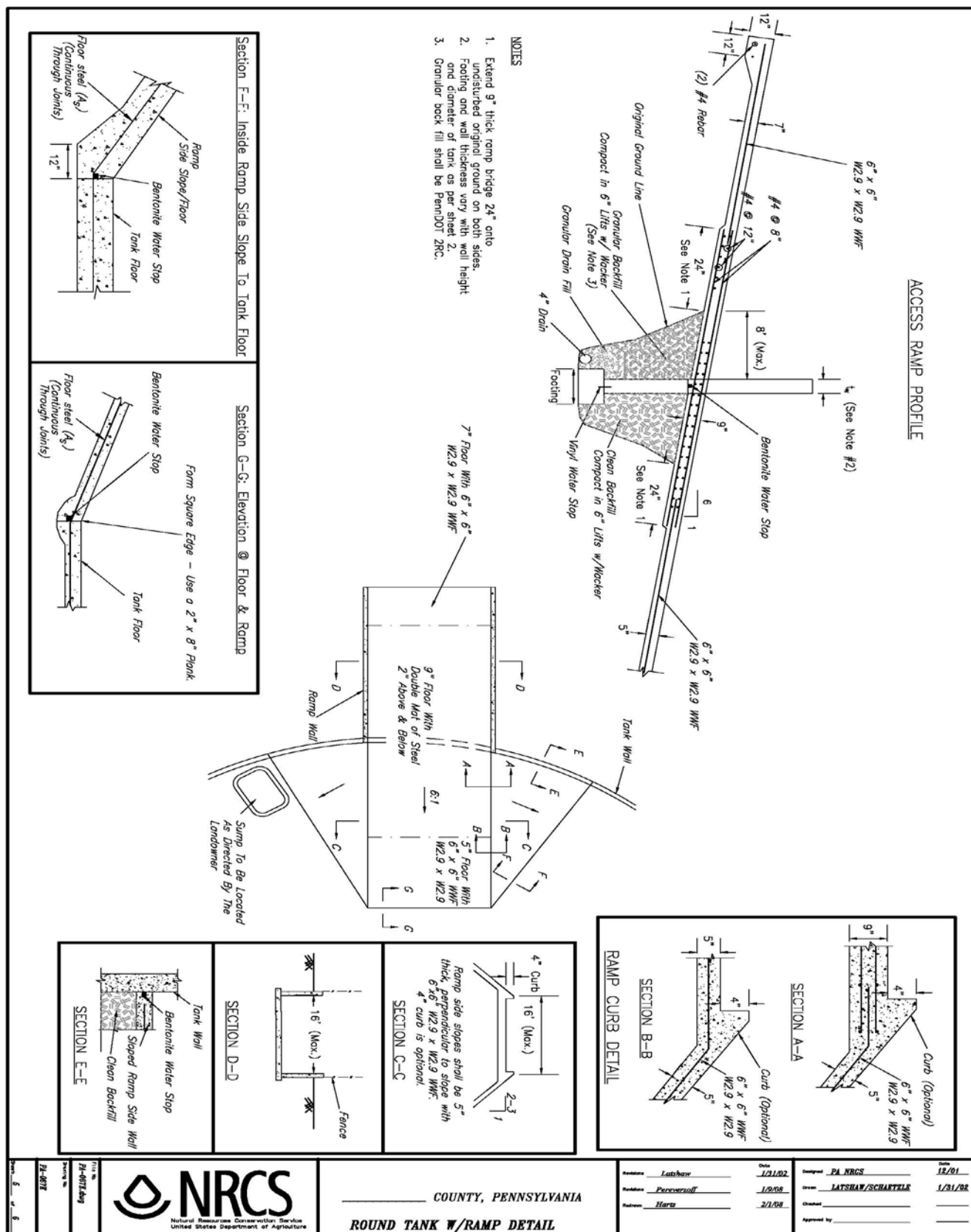
TOP VIEW OF WALL JOINT



____ COUNTY, PENNSYLVANIA
ROUND TANK W/RAMP DETAIL

Revised: Lathaw 1/31/02
Revised: Parsons 1/30/08
Revised: Harris 2/1/08

Drawn: PA NRCS 12/01
Drawn: LATHAW/SCHAEFER 1/31/02
Checked: _____
Approved by: _____



Results for the 14'x180' circular tank with ramp:

Circular tank:

Tank Diameter = 180 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 14 ft
 $f_y = 60,000$ psi
 $f_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	8	4' 7"
7	8	5' 3"
8	8	5' 11"
9	8	6' 7"
10	8	7' 3"
11	6	7' 9"
12	6	8' 3"
13	6	8' 9"
14	6	9' 3"
15	6	9' 9"
16	6	10' 3"
17	6	10' 9"
18	6	11' 3"
19	6	11' 9"
20	6	12' 3"
21	6	12' 9"
22	6	13' 3"
23	6	13' 9"

Vertical Steel = #4 @ 9" O.C. in each face.

Dowels "L" bars from tank to footing shall be #4 @ 9" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

For a length of 80 feet, centered on the ramp:

Substitute #5 rebar for the #4 horizontal rebar for bars #2 to bar #12 in the tank. (11 bars in each mat of steel, 22 total).


Substitute #5 @ 9" O.C. vertical steel in each face for the #4 @ 9" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

4-#6 bars x 13'-10" long @ 6" O.C. vertically in each mat of steel (8 total)

4-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (8 total)

4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

 Natural Resources Conservation Services United States Department of Agriculture	_____ County, PA ROUND TANK W/RAMP DETAIL Page 6.31	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 14'x160' circular tank with ramp:

Circular tank:

Tank Diameter = 160 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 14 ft
 $f_y = 60,000$ psi
 $f_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	10	1' 1"
3	10	1' 11"
4	10	2' 9"
5	9	3' 6"
6	9	4' 3"
7	9	5' 0"
8	9	5' 9"
9	8	6' 5"
10	8	7' 1"
11	8	7' 9"
12	8	8' 5"
13	8	9' 1"
14	8	9' 9"
15	8	10' 5"
16	8	11' 1"
17	8	11' 9"
18	8	12' 5"
19	8	13' 1"
20	8	13' 9"

Vertical Steel = #4 @ 10" O.C. in each face.

Dowels "L" bars from tank to footing shall be #4 @ 10" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

For a length of 80 feet, centered on the ramp:

Substitute #5 rebar for the #4 horizontal rebar for bars #4 to bar #11 in the tank. (8 extra bars in each mat of steel, 16 total).


Substitute #5 @ 10" O.C. vertical steel in each face for the #4 @ 10" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

4-#6 bars x 13'-10" long @ 6" O.C. vertically in each mat of steel (8 total)

4-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (8 total)

4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

 <p>Natural Resources Conservation Services United States Department of Agriculture</p>	<p>_____ County, PA</p> <p>ROUND TANK W/RAMP</p> <p>DETAIL Page 6.30</p>	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 14'x140' circular tank with ramp:

Circular tank:

Tank Diameter = 140 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 14 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	10	4' 1"
6	10	4' 11"
7	8	5' 7"
8	8	6' 3"
9	8	6' 11"
10	8	7' 7"
11	8	8' 3"
12	8	8' 11"
13	8	9' 7"
14	8	10' 3"
15	10	11' 1"
16	10	11' 11"
17	10	12' 9"
18	12	13' 9"

Vertical Steel = #4 @ 12" O.C. in each face.

Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

For a length of 80 feet, centered on the ramp:

Substitute #5 rebar for the #4 horizontal rebar for bars #3 to bar #10 in the tank. (8 extra bars in each mat of steel, 16 total).


Substitute #5 @ 12" O.C. vertical steel in each face for the #4 @ 12" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

4-#6 bars x 13'-10" long @ 4" O.C. vertically in each mat of steel (8 total)

4-#6 bars x 20' long @ 4" O.C. horizontally in each mat of steel (8 total)

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle in each mat of steel (8 total).

 <p>Natural Resources Conservation Services United States Department of Agriculture</p>	<p>County, PA</p> <p>ROUND TANK W/RAMP</p> <p>DETAIL Page 6.29</p>	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 14'x120' circular tank with ramp:

Circular tank:

Tank Diameter = 120 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 14 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	10	1' 1"
3	10	1' 11"
4	8	2' 7"
5	8	3' 3"
6	6	3' 9"
7	6	4' 3"
8	6	4' 9"
9	6	5' 3"
10	6	5' 9"
11	6	6' 3"
12	6	6' 9"
13	6	7' 3"
14	6	7' 9"
15	6	8' 3"
16	6	8' 9"
17	8	9' 5"
18	8	10' 1"
19	8	10' 9"
20	10	11' 7"
21	10	12' 5"
22	10	13' 3"
23	6	13' 9"

Vertical Steel = #5 @ 8" O.C.

Dowels "L" bars from tank to footing shall be #5 @ 8" O.C. 30" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 4-#6 bars x 7'-10" long @ 4" O.C. vertically
- 4-#6 bars x 20' long @ 4" O.C. horizontally
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

 Natural Resources Conservation Services United States Department of Agriculture	_____ County, PA ROUND TANK W/RAMP DETAIL Page 6.28	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x200' circular tank with ramp:

Circular tank:

Tank Diameter = 200 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f_c = 4,000$ psi

Horizontal Steel = #5 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	14	1' 5"
3	12	2' 5"
4	12	3' 5"
5	12	4' 5"
6	12	5' 5"
7	12	6' 5"
8	12	7' 5"
9	12	8' 5"
10	10	9' 3"
11	10	10' 1"
12	10	10' 11"
13	10	11' 9"


Vertical Steel = #4 @ 12" O.C. in each face.

Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

For a length of 80 feet, centered on the ramp substitute #5 @ 12" O.C. vertical steel in each face for the #4 @ 12" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

- 4-#6 bars x 11'-10" long @ 6" O.C. vertically in each mat of steel (6 total)
- 4-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (6 total)
- 4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

 <p>Natural Resources Conservation Services United States Department of Agriculture</p>	<p>____ County, PA</p> <p>ROUND TANK W/RAMP</p> <p>DETAIL Page 6.27</p>	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x160' circular tank with ramp:

Circular tank:


Tank Diameter = 160 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	10	4' 9"
7	10	5' 7"
8	10	6' 5"
9	10	7' 3"
10	9	8' 0"
11	9	8' 9"
12	9	9' 6"
13	9	10' 3"
14	9	11' 0"
15	9	11' 9"

Vertical Steel = #4 @ 12" O.C. in each face.
Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 4-#6 bars x 13'-10" long @ 6" O.C. vertically in each mat of steel (8 total)
- 4-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (8 total)
- 4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

 <p>Natural Resources Conservation Services United States Department of Agriculture</p>	<p>County, PA</p> <p>ROUND TANK W/RAMP</p> <p>DETAIL Page 6.25</p>	<p>Designed <u>PA NRCS</u> <u>12/01</u></p> <p>Drawn <u>Hartz</u> <u>2/1/08</u></p> <p>Revisions <u>Pereverzoff</u> <u>1/9/08</u></p> <p>Checked _____</p> <p>Approved _____</p>

Results for the 12'x140' circular tank with ramp:

Circular tank:

Tank Diameter = 140 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f_c = 4,000$ psi

Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	8	3' 9"
6	8	4' 5"
7	8	5' 1"
8	8	5' 9"
9	8	6' 5"
10	8	7' 1"
11	8	7' 9"
12	8	8' 5"
13	8	9' 1"
14	8	9' 9"
15	8	10' 5"
16	8	11' 1"
17	8	11' 9"

Vertical Steel = #5 @ 10" O.C.


Dowels "L" bars from tank to footing shall be #5 @ 10" O.C. 30" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

4-#6 bars x 13'-10" long @ 4" O.C. vertically

4-#6 bars x 20' long @ 4" O.C. horizontally

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle

 Natural Resources Conservation Services United States Department of Agriculture	_____ County, PA ROUND TANK W/RAMP DETAIL Page 6.24	Designed <u>PA NRCS</u> <u>12/01</u>
		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x120' circular tank with ramp:

Circular tank:

Tank Diameter = 120 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	10	2' 1"
4	10	2' 11"
5	10	3' 9"
6	8	4' 5"
7	8	5' 1"
8	8	5' 9"
9	8	6' 5"
10	8	7' 1"
11	8	7' 9"
12	8	8' 5"
13	10	9' 3"
14	10	10' 1"
15	10	10' 11"
16	10	11' 9"

Vertical Steel = #5 @ 10" O.C.

Dowels "L" bars from tank to footing shall be #5 @ 10" O.C. 30" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 4-#6 bars x 7'-10" long @ 4" O.C. vertically
- 4-#6 bars x 20' long @ 4" O.C. horizontally
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x100' circular tank with ramp:

Circular tank:

Tank Diameter = 100 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	10	4' 9"
7	10	5' 7"
8	10	6' 5"
9	10	7' 3"
10	10	8' 1"
11	10	8' 11"
12	10	9' 9"
13	12	10' 9"
14	12	11' 9"

Vertical Steel shall be #4 @ 8" O.C.


Dowels "L" bars shall be #4 @ 8" O.C. with a horizontal leg of 8" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

4-#6 bars x 11'-10" long @ 4" O.C. vertically.

4-#6 bars x 20' long @ 4" O.C. horizontally.

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x80' circular tank with ramp:

Circular tank:

Tank Diameter = 80 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	10	1' 1"
3	10	1' 11"
4	8	2' 7"
5	8	3' 3"
6	8	3' 11"
7	8	4' 7"
8	6	5' 1"
9	6	5' 7"
10	6	6' 1"
11	6	6' 7"
12	6	7' 1"
13	8	7' 9"
14	8	8' 5"
15	10	9' 3"
16	10	10' 1"
17	10	10' 11"
18	10	11' 9"


Vertical Steel shall be #4 @ 9" O.C.

Dowels "L" bars shall be #4 @ 9" O.C. with a horizontal leg of 8" and a vertical leg of 26"

For a length of 60 feet, centered on the ramp, substitute #5 rebar for the #4 horizontal rebar for bars #5 to bar #10 in the tank (6 bars total).

In the tank wall, at the notch for the ramp add:

- 4-#6 bars x 11'-10" long @ 4" O.C. vertically.
- 4-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 12'x60' circular tank with ramp:

Circular tank:

Tank Diameter = 60 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	10	2' 1"
4	10	2' 11"
5	9	3' 8"
6	9	4' 5"
7	9	5' 2"
8	9	5' 11"
9	9	6' 8"
10	10	7' 6"
11	10	8' 4"
12	12	9' 4"
13	12	10' 4"
14	12	11' 4"
15	5	11' 9"


Vertical Steel = #4 @ 10" O.C.

Dowels "L" bars shall be #4 @ 10" O.C. with a horizontal leg of 8" and a vertical leg of 26"

For a length of 60 feet, centered on the ramp, substitute #5 rebar for the #4 horizontal rebar for bars #3 to bar #10 in the tank.

In the tank wall, at the notch for the ramp add:

- 4-#6 bars x 11'-10" long @ 4" O.C. vertically.
- 4-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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Results for the 12'x40' circular tank with ramp:

Circular tank:

Tank Diameter = 40 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 12 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	10	4' 9"
7	10	5' 7"
8	10	6' 5"
9	10	7' 3"
10	12	8' 3"
11	12	9' 3"
12	12	10' 3"
13	12	11' 3"
14	6	11' 9"


Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

For a length of 60 feet, centered on the ramp, substitute #5 rebar for the #4 horizontal rebar for bars #5 to bar #9 in the tank (5 bars total).

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 11'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Checked _____
		Approved _____

Results for the 10'x200' circular tank with ramp:

Circular tank:

Tank Diameter = 200 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	10	4' 1"
6	10	4' 11"
7	10	5' 9"
8	10	6' 7"
9	8	7' 3"
10	8	7' 11"
11	8	8' 7"
12	8	9' 3"
13	6	9' 9"

Vertical Steel = #4 @ 12" O.C. in each face.


Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. at the interior mat of steel. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

3-#6 bars x 11'-10" long @ 6" O.C. vertically in each mat of steel (6 total)

3-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (6 total)

4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

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		Checked _____
		Approved _____

Results for the 10'x180' circular tank with ramp:

Circular tank:

Tank Diameter = 180 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	8	4' 7"
7	8	5' 3"
8	8	5' 11"
9	8	6' 7"
10	8	7' 3"
11	6	7' 9"
12	6	8' 3"
13	6	8' 9"
14	6	9' 3"
15	6	9' 9"

Vertical Steel = #4 @ 9" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 9" O.C. 26" vertical leg, 8" horizontal leg

For a length of 60 feet, centered on the ramp:


Substitute #5 @ 9" O.C. vertical steel in each face for the #4 @ 9" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

3-#6 bars x 9'-10" long @ 6" O.C. vertically.

3-#6 bars x 20' long @ 6" O.C. horizontally.

4-#6 bars x 6' long @ 6" O.C. at a 45 degree angle.

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		Checked _____
		Approved _____

Results for the 10'x160' circular tank with ramp:

Circular tank:

Tank Diameter = 160 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	10	4' 1"
6	10	4' 11"
7	10	5' 9"
8	8	6' 5"
9	8	7' 1"
10	8	7' 9"
11	8	8' 5"
12	8	9' 1"
13	8	9' 9"

Vertical Steel = #4 @ 10" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 10" O.C. 26" vertical leg, 8" horizontal leg

For a length of 60 feet, centered on the ramp:


Substitute #5 @ 10" O.C. vertical steel for the #4 @ 10" O.C. vertical steel.

In the tank wall, at the corner of the notch for the ramp add:

3-#6 bars x 9'-10" long @ 6" O.C. vertically.

3-#6 bars x 20' long @ 6" O.C. horizontally.

4-#6 bars x 6' long @ 6" O.C. at a 45 degree angle.

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		Approved _____

Results for the 10'x140' circular tank with ramp:

Circular tank:

Tank Diameter = 140 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	10	5' 1"
7	10	5' 11"
8	10	6' 9"
9	10	7' 7"
10	10	8' 5"
11	9	9' 2"
12	7	9' 9"

Vertical Steel = #4 @ 10" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 10" O.C. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 3-#6 bars x 9'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 10'x120' circular tank with ramp:

Circular tank:

Tank Diameter = 120 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	10	2' 1"
4	8	2' 9"
5	8	3' 5"
6	8	4' 1"
7	8	4' 9"
8	8	5' 5"
9	8	6' 1"
10	8	6' 9"
11	6	7' 3"
12	6	7' 9"
13	6	8' 3"
14	6	8' 9"
15	6	9' 3"
16	6	9' 9"

Vertical Steel = #4 @ 10" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 10" O.C. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 3-#6 bars x 7'-10" long @ 6" O.C. vertically
- 3-#6 bars x 20' long @ 6" O.C. horizontally
- 4-#6 bars x 6' long @ 6" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 10'x100' circular tank with ramp:

Circular tank:

Tank Diameter = 100 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	10	1' 1"
3	10	1' 11"
4	10	2' 9"
5	8	3' 5"
6	8	4' 1"
7	8	4' 9"
8	8	5' 5"
9	8	6' 1"
10	8	6' 9"
11	8	7' 5"
12	8	8' 1"
13	10	8' 11"
13	10	9' 9"

Vertical Steel shall be #4 @ 10" O.C.


Dowels "L" bars shall be #4 @ 10" O.C. with a horizontal leg of 8" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

3-#6 bars x 11'-10" long @ 4" O.C. vertically.

3-#6 bars x 20' long @ 4" O.C. horizontally.

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 10'x80' circular tank with ramp:

Circular tank:

Tank Diameter = 80 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	10	1' 1"
3	10	1' 11"
4	10	2' 9"
5	9	3' 6"
6	9	4' 3"
7	9	5' 0"
8	9	5' 9"
9	10	6' 7"
10	10	7' 5"
11	10	8' 3"
12	10	9' 1"
13	8	9' 9"


Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

For a length of 60 feet, centered on the ramp, substitute #5 rebar for the #4 horizontal rebar for bars #4 to bar #9 in the tank (6 bars total).

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 9'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 10'x60' circular tank with ramp:

Circular tank:

Tank Diameter = 60 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	10	2' 1"
4	10	2' 11"
5	10	3' 9"
6	10	4' 7"
7	10	5' 5"
8	10	6' 3"
9	12	7' 3"
10	12	8' 3"
11	12	9' 3"
12	6	9' 9"

Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 9'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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Results for the 10'x40' circular tank with ramp:

Circular tank:

Tank Diameter = 40 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 10 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	12	6' 3"
8	12	7' 3"
9	12	8' 3"
10	12	9' 3"
11	6	9' 9"

Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 9'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 8'x200' circular tank with ramp:

Circular tank:

Tank Diameter = 200 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	8	5' 11"
8	8	6' 7"
9	8	7' 3"
10	6	7' 9"

Vertical Steel = #4 @ 12" O.C. in each face.


Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. at the interior mat of steel.
26" vertical leg, 6" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

3-#6 bars x 7'-10" long @ 6" O.C. vertically in each mat of steel (6 total)

3-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (6 total)

4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

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Results for the 8'x180' circular tank with ramp:

Circular tank:

Tank Diameter = 180 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #5 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	10	4' 1"
6	10	4' 11"
7	10	5' 9"
8	8	6' 5"
9	8	7' 1"
10	8	7' 9"

Vertical Steel = #4 @ 12" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 3-#6 bars x 7'-10" long @ 6" O.C. vertically.
- 3-#6 bars x 20' long @ 6" O.C. horizontally.
- 4-#6 bars x 6' long @ 6" O.C. at a 45 degree angle.

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		Checked _____
		Approved _____

Results for the 8'x160' circular tank with ramp:

Circular tank:

Tank Diameter = 160 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	10	2' 1"
4	10	2' 11"
5	8	3' 7"
6	8	4' 3"
7	6	4' 9"
8	6	5' 3"
9	6	5' 9"
10	6	6' 3"
11	6	6' 9"
12	6	7' 3"
13	6	7' 9"

Vertical Steel = #4 @ 12" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 3-#6 bars x 9'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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		Drawn <u>Hartz</u> <u>2/1/08</u>
		Revisions <u>Pereverzoff</u> <u>1/9/08</u>
		Checked _____
		Approved _____

Results for the 8'x140' circular tank with ramp:

Circular tank:

Tank Diameter = 140 ft
Tank Wall thickness = 10 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	8	4' 7"
7	8	5' 3"
8	6	5' 9"
9	6	6' 3"
10	6	6' 9"
11	6	7' 3"
12	6	7' 9"

Vertical Steel = #4 @ 12" O.C.


Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. 26" vertical leg, 8" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

3-#6 bars x 7'-10" long @ 4" O.C. vertically.

3-#6 bars x 20' long @ 4" O.C. horizontally.

4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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Results for the 8'x120' circular tank with ramp:

Circular tank:

Tank Diameter = 120 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	10	3' 1"
5	10	3' 11"
6	10	4' 9"
7	9	5' 6"
8	9	6' 3"
9	9	7' 0"
10	9	7' 9"

Vertical Steel = #4 @ 12" O.C.

Dowels "L" bars from tank to footing shall be #4 @ 12" O.C. 26" vertical leg, 6" horizontal leg

In the tank wall, at the corner of the notch for the ramp add:

- 3-#6 bars x 7'-10" long @ 6" O.C. vertically
- 3-#6 bars x 20' long @ 6" O.C. horizontally
- 4-#6 bars x 6' long @ 6" O.C. at a 45 degree angle.

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Results for the 8'x100' circular tank with ramp:

Circular tank:

Tank Diameter = 100 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	10	6' 1"
8	10	6' 11"
9	10	7' 9"

Vertical Steel shall be #4 @ 12" O.C.


Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

3-#6 bars x 11'-10" long @ 4" O.C. vertically.

3-#6 bars x 20' long @ 4" O.C. horizontally.

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle.

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Results for the 8'x80' circular tank with ramp:

Circular tank:

Tank Diameter = 80 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	12	6' 3"
8	12	7' 3"
9	6	7' 9"

Vertical Steel shall be #4 @ 12" O.C.


Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

3-#6 bars x 7'-10" long @ 4" O.C. vertically.

3-#6 bars x 20' long @ 4" O.C. horizontally.

4-#6 bars x 6 feet long @ 4" O.C. at a 45 degree angle.

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		Checked _____
		Approved _____

Results for the 8'x60' circular tank with ramp:

Circular tank:

Tank Diameter = 60 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	12	6' 3"
8	12	7' 3"
9	6	7' 9"

Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 7'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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Results for the 8'x40' circular tank with ramp:

Circular tank:

Tank Diameter = 40 ft
Tank Wall thickness = 8 in (actual)
Tank Height = 8 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi


Horizontal Steel = #4 rebar		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	12	1' 3"
3	12	2' 3"
4	12	3' 3"
5	12	4' 3"
6	12	5' 3"
7	12	6' 3"
8	12	7' 3"
9	6	7' 9"

Vertical Steel shall be #4 @ 12" O.C.

Dowels "L" bars shall be #4 @ 12" O.C. with a horizontal leg of 6" and a vertical leg of 26"

In the tank wall, at the notch for the ramp add:

- 3-#6 bars x 7'-10" long @ 4" O.C. vertically.
- 3-#6 bars x 20' long @ 4" O.C. horizontally.
- 4-#6 bars x 6' long @ 4" O.C. at a 45 degree angle.

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Results for the 14'x200' circular tank with ramp:

Circular tank:

Tank Diameter = 200 ft
Tank Wall thickness = 12 in (actual)
Tank Height = 14 ft
 $f_y = 60,000$ psi
 $f'_c = 4,000$ psi

Horizontal Steel = #5 rebar Steel shown in table must be placed in each face of the wall		
Bar #	Spacing (in)	Distance from finished floor (ft - in)
1	3	0' 3"
2	18	1' 9"
3	18	3' 3"
4	12	4' 3"
5	12	5' 3"
6	12	6' 3"
7	10	7' 1"
8	10	7' 11"
9	10	8' 9"
10	10	9' 7"
11	10	10' 5"
12	10	11' 3"
13	10	12' 1"
14	10	12' 11"
15	10	13' 9"

Vertical Steel = #4 @ 9" O.C. in each face.

Dowels "L" bars from tank to footing shall be #4 @ 9" O.C. at the interior mat of steel. 26" vertical leg, 10" horizontal leg

For a length of 80 feet, centered on the ramp:

Add an extra #4 rebar between the #5 horizontal rebar for bars #1 to bar #8 in the tank (8 extra bars per steel mat – 16 bars total).


Substitute #5 @ 9" O.C. vertical steel in each face for the #4 @ 9" O.C. vertical steel in each face.

In the tank wall, at the corner of the notch for the ramp add:

4-#6 bars x 13'-10" long @ 6" O.C. vertically in each mat of steel (8 total)

4-#6 bars x 20' long @ 6" O.C. horizontally in each mat of steel (8 total)

4-#6 bars x 6 feet long @ 6" O.C. at a 45 degree angle in each mat of steel (8 total).

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		Checked _____
		Approved _____